JetOS93 Lite
User Manual

www.korenix.com

0.0.3

Copyright Notice

Information provided in this manual is intended to be accurate and reliable. However, the original manufacturer assumes no responsibility for its use, or for any infringements upon the rights of third parties that may result from its use.
The material in this document is for product information only and is subject to change without notice. While reasonable efforts have been made in the preparation of this document to assure its accuracy, Korenix assumes no liabilities resulting from errors or omissions in this document, or from the use of the information contained herein.
Korenix reserves the right to make changes in the product design without notice to its users.

Acknowledgments

Table of Content

Chapter 1 Overview

The advantage of adopting Korenix JetBox series is ready-to-use. Korenix is devoted to improve the usability of embedded computer in industrial domain. Besides operating system, Korenix provides device drivers, protocol stacks, system utilities, supporting services and daemons to make system integration simple. Further, Korenix provides application development toolkits for users to build up their own applications easily.

The stylish JetBox 3300 series is a compact-sized embedded Linux computer with low power consumption, designed to fit in small front-end controller system applications. With 16DIO channels in addition to the dual Ethernet, dual USB and dual serial ports, the embedded computers help users to extend the dataset to provide more flexible connection configurations for versatile control applications.

1-1 Applied Models

JetBox3300 series
*JetBox5300 series

Note: SW features might be different according to different products

Chapter 2 Getting Start

2-1 System login

Users can enter the JetBox Linux environment via the user name: root and no password is required.

login : root
password : (none)

2-1-1 Telnet Console

The default IP address and Netmask for each port is given below:

	system naming	Default IP address	Netmask
LAN1	eth1	192.168.10.1	255.255.255.0
LAN2	eth0	DHCP	

Default IP address and Netmask

Use a cross-over Ethernet Cable to connect directly from your PC to JetBox 3300. You should first modify your PC's IP address and netmask so that your PC is on the same subnet as JetBox.
To connect to a hub or switch connected to your local LAN, use a straight-through Ethernet cable. The default IP address and netmask are shown above. To login, type the Login name and password as requested. The default values as following:
Login: root
Password: none

```
$ telnet 192.168.10.1
Trying 192.168.10.1...
Connected to 192.168.10.1.
Escape character is '^]'.
JetBox 3300 login: root
~ $
```

Telnet console screen

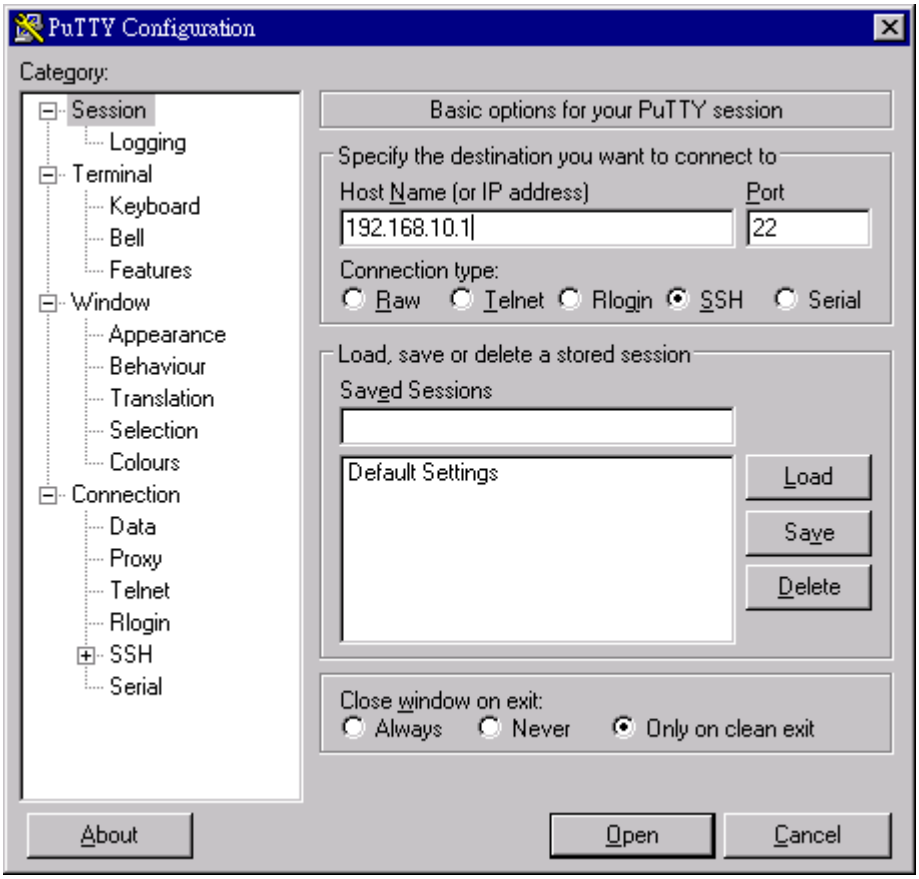
You can proceed with the configuration of JetBox3300's network settings when you reach

the Linux command shell. Configuration instructions are given in the next section.

2-1-2 SSH Console

Start from firmware v1.8, JetBox3300 supports an SSH Console to offer users with better security options. To enable the SSH Console, you must start the SSH daemon first:
/etc/init.d/S50sshd start

On your PC, click on the link putty to download PuTTy(freeware) and set up an SSH console for JetBox 3300 in a Windows environment. The following figure shows an example of the configuration that is required.



Windows PuTTy setting

2-2 Configure Ethernet Interface

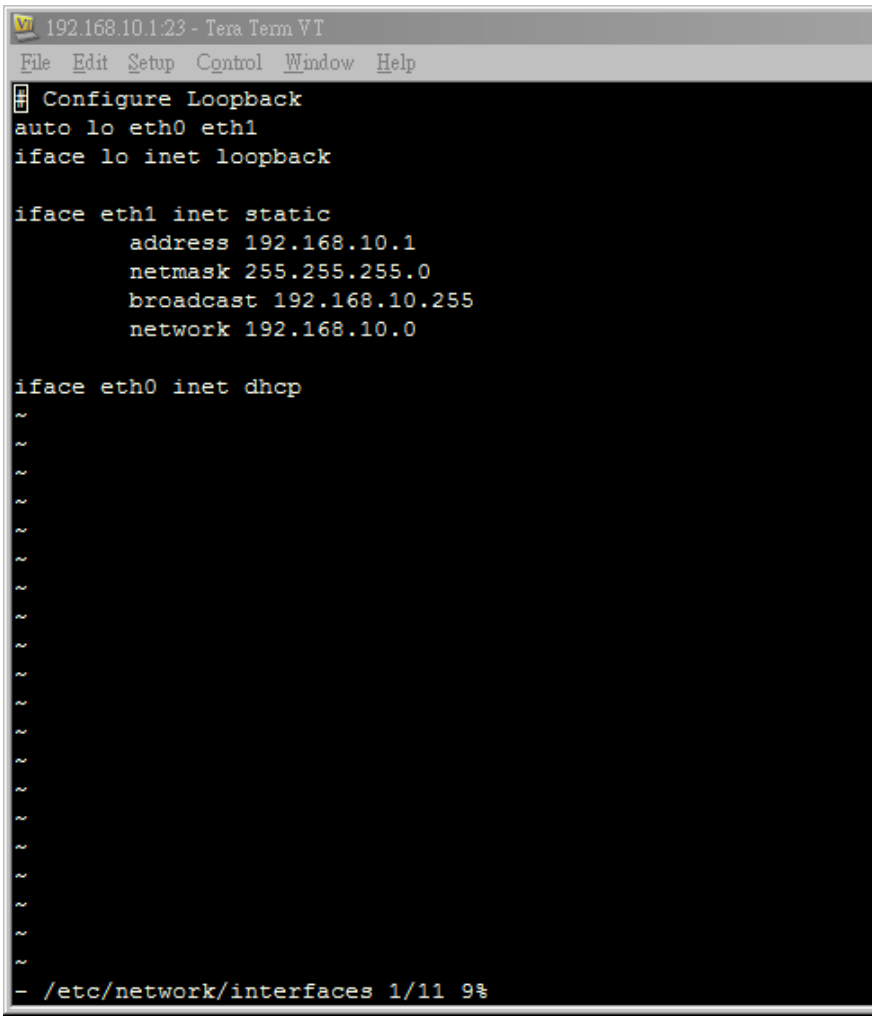
JetBox3300 network setting can be modified with the telnet, over the network.

2-2-1 Modifying Network Settings with the Telnet Console

In this section, we use the serial console to modify JetBox3300's network settings

- **Change Network Configuration**

  Follow the instructions given in a previous section to login to jetbox3300 linux, and then type 'vi /etc/network/interfaces' to edit network configuration file with vi editor.



Edit Network configuration file

- **Static and Dynamic IP address**

  Static IP address:

  As shown in below, 4 fields must be modified: **address**, **netmask**, **broadcast** and **network**. The default IP addresses are 192.168.10.1.

```
iface eth1 inet static
        address 192.168.10.1
        netmask 255.255.255.0
        broadcast 192.168.10.255
        network 192.168.10.0
```

Dynamic IP addresses:

By default, the Jetbox3300 is configured for “static” IP addresses on LAN1 interface and dhcp on LAN2 (eth0) interface. To configure LAN1 (eth1) port to request an IP address dynamically, remove the original settings and add the following line.

```
iface eth0 inet dhcp
```

Default setting for LAN1 port	Default setting for LAN2 port
iface eth1 inet static address 192.168.10.1 netmask 255.255.255.0 broadcast 192.168.10.255 network 192.168.10.0	iface eth0 inet dhcp

Default Gateway:

When static IP Address setting is used, add a default gateway is to set another keyword “gateway”. For example:

```
iface eth0 inet static
        address 192.168.1.2
        netmask 255.255.255.0
        broadcast 192.168.1.255
        network 192.168.1.0
        gateway 192.168.1.1    # This will set default gateway to
                               #192.168.1.1 on this port
```

2-2-2 Static and Dynamic IP address

After the /etc/network/interfaces file have been modified, issue the following command to apply the network settings immediately:

```
/etc/init.d/network restart
```

2-2-3 Modifying Network Settings over the Network

Same the previous section, IP settings can be modified over the network, too. There is another way to change the IP address without modifying the file /etc/network/interfaces, but the new settings will **not** be saved to the flash disk.

For example, type the command **#ifconfig eth1 192.168.10.2** to change the IP address of LAN1 interface to 192.168.10.2.

```
eth0      Link encap:Ethernet  HWaddr 00:12:77:00:33:50
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:3 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:1770 (1.7 KiB)
          Interrupt:92 Base address:0xc000

eth1      Link encap:Ethernet  HWaddr 00:12:77:00:33:00
          inet addr:192.168.10.1  Bcast:192.168.10.255  Mask:255.255.255.0
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:504 errors:0 dropped:0 overruns:0 frame:0
          TX packets:321 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:35069 (34.2 KiB)  TX bytes:30309 (29.5 KiB)
          Interrupt:24 Base address:0xc000

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          UP LOOPBACK RUNNING  MTU:16436  Metric:1
          RX packets:18 errors:0 dropped:0 overruns:0 frame:0
          TX packets:18 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:1302 (1.2 KiB)  TX bytes:1302 (1.2 KiB)

~ $ ifconfig eth0 192.168.1.2
~ $ ifconfig eth0
eth0      Link encap:Ethernet  HWaddr 00:12:77:00:33:50
          inet addr:192.168.1.2  Bcast:192.168.1.255  Mask:255.255.255.0
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:3 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:1770 (1.7 KiB)
          Interrupt:92 Base address:0xc000
```

Network Setting over the Network

NOTE

For older version of firmware, please carefully edit the /etc/init.d/S50net to change the ip address.

For example, if you want to change LAN1's ip address to 192.168.10.2, add the following line to the end of S50net file.

ifconfig eth1 192.168.10.2

To use dhcp to obtain LAN2's ip address, add the following line to the tail of S50net file.

udhcpc –i eth0

2-3 Test Program Developing – Hello.c

In this section, we use the standard "Hello" programming example to illustrate how to develop a program for the JetOS93 lite. In general, program development involves the following seven steps.

Step 1:

Connect the JetBox3300 to a Linux PC.

Step 2:

Install Toolchain on the Linux PC.

Step 3:

Set the cross compiler and PATH environment variables.

Step 4:

Code and compile the program.

Step 5:

Download the program to the JetBox3300 via FTP.

Step 6:

Debug the program

- If bugs are found, return to Step 4.
- If no bugs are found, continue with Step 7.

Step 7:

Back up the user directory (distribute the program to additional JetBox3300 units if needed).

2-3-1 Installing the Toolchain (Linux)

The Linux Operating System must be pre-installed in the PC before installing the JetOS93 lite Toolchain. Fedora core or compatible versions are recommended. The Toolchain

requires approximately 208 MB of hard disk space on your PC. The JetOs93 lite Toolchain is included with JetOS93 lite SDK, which can download from Korenix web site. To install the Toolchain, it is simply a matter of extracting a tarball at the proper place:

```
tar jxvf jetbox9300-toolchains.tar.bz2 -C /
```

NOTE

- To install the Toolchain, you must grant root permission.
- Toolchains used to not be relocatable! You must install them in the location they were built for.

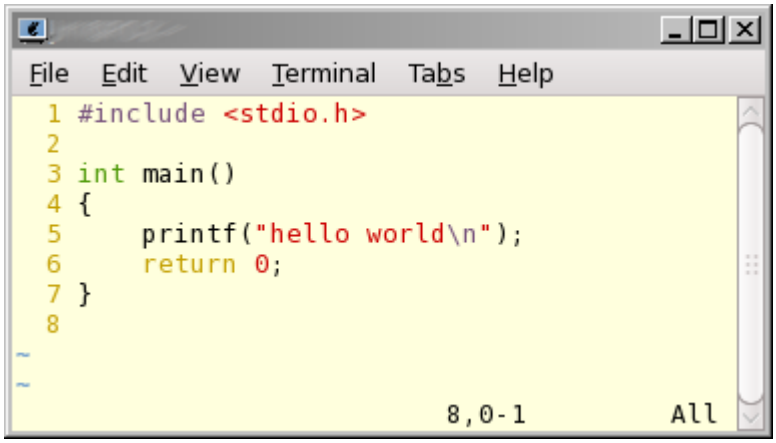
Install toolchain is simple, just extract to the /opt directory with the command.
We have include the /opt dir in the tarball, so just uncompress it to /. Next, set up the PATH environment variable, add the toolchain path with export command. The PATH is a variable of your current SHELL. This is also the default search path of Linux command.

```
export PATH=/opt/korenix/toolchains/jetbox9300/bin/:$PATH
```

Setting the PATH allows you to run the compiler from any directory.

2-3-2 Compiling Hello.c

If you have been compiling a program on X86, then you will find the only difference is the GCC command is start with **arm-linux-**.
That is because we want to differentiate with the stand GCC compiler, and the prefix also tell you – it is for arm platform program.
Below is a simple hello.c program:



To compile the helo.c, use our Toolchain to compile the hello.c:

```
arm-linux-gcc hello.c -o helloworld
```

The output executable file is the *helloworld*.

2-3-3 Uploading "test" to JetBox3300 and Running the Program

Use the following command to upload helloworld to the JetBox3300 via FTP.

1. From the PC, type:

 # ftp xxx.xxx.xxx.xxx (the default username/password is ftp/ftp)

2. Use *bin* command to set the transfer mode to Binary mode, and the put command to initiate the file transfer:

ftp> bin

ftp> put test

```
[root@server ~]# ftp 192.168.10.1
Connected to 192.168.10.1.
220 (none) FTP server (GNU inetutils 1.8) ready.
Name (192.168.10.1:xyz): ftp
331 Guest login ok, type your name as password.
Password:
230 Guest login ok, access restrictions apply.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp> cd /home/
250 CWD command successful
ftp> put helloworld
local: helloworld remote: helloworld
227 Entering Passive Mode (192,168,1,176,19,6).
150 Opening BINARY mode data connection for helloworld
226 Transfer complete
4455 bytes sent in 4.1e-05 secs (108658.54 Kbytes/sec)
ftp> exit
221 Goodbye.
```

3. From the JetBox3300 console, type:

 # chmod +x helloworld

 # ./helloworld

The word hello world will be printed on the screen.

```
# ls
firmware.bin  helloworld
# chmod a+x helloworld
# ./helloworld
hello world
#
```

Please read Chapter 6 for more detail about Toolchain.

Chapter 3 System Feature

This chapter includes information about version control, deployment, updates, and peripherals. The information in this chapter will be particularly useful when you need to run the same application on several JetBox units.

3-1 System Version

To determine the hardware capability of your JetBox, and what kind of software functions are supported, check the version numbers of your JetBox's hardware, kernel, and user file system. Contact Korenix to determine the hardware version. You will need the Production S/N (Serial number), which is located on the JetBox3300's back label.

To check the **firmware** version, type:

```
# version
```

```
~ $ version
JetBox 3300 Firmware Version: 2.1.1  Build 05 04 2012 08:34:15.
~ $
```

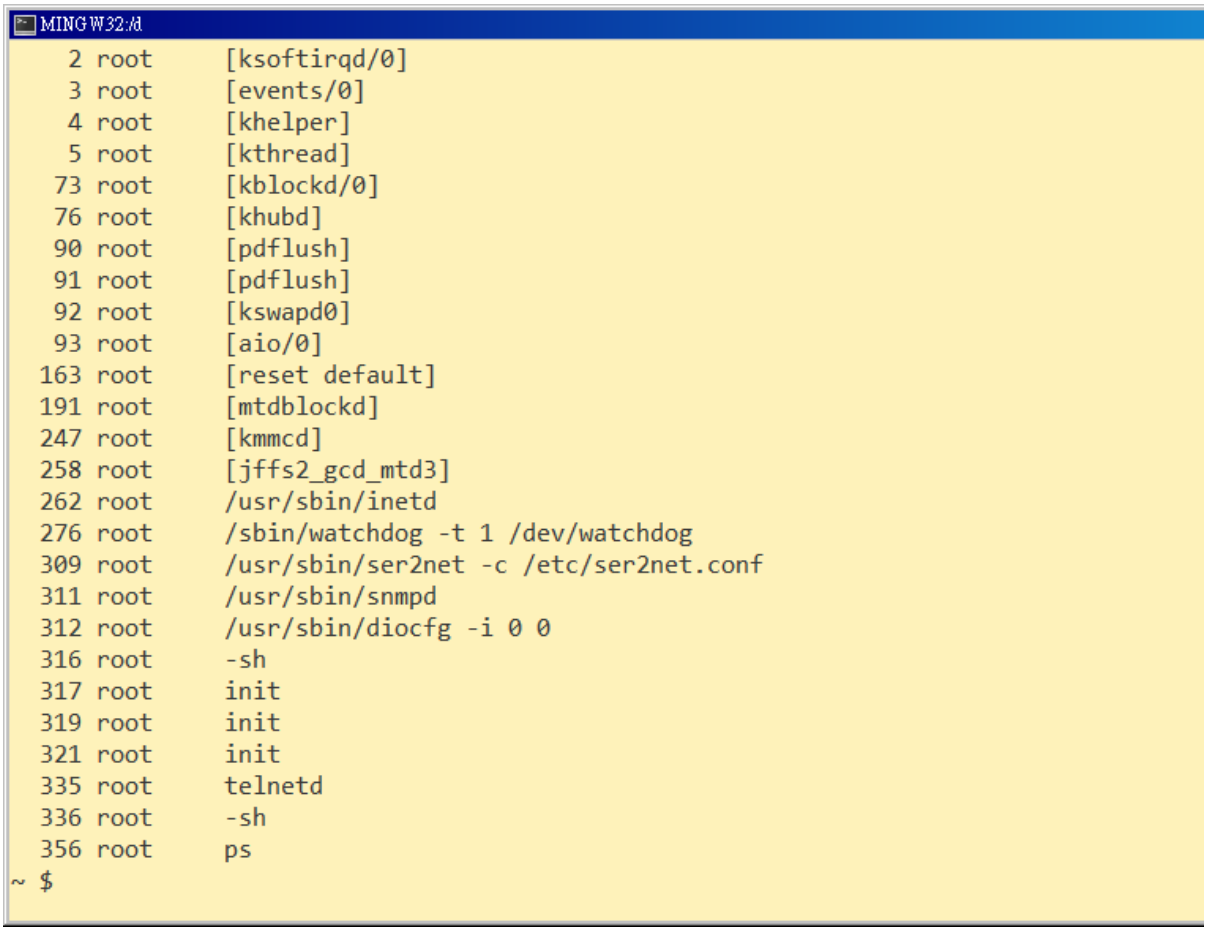
Figure 3-1 Firmware version

3-2 Enable/Disable Daemons

The following daemons are enabled when the JetBox 3300 boots up for the first time.

Service name	Description
inetd	internet daemons
telnetd	telnet daemon
ftpd	ftp daemon
ser2net	serial to ethernet proxy

Type the command "**ps**" to list all processes currently running.



daemons status

Here is an example of starting and stopping the ssh daemon:

```
~ $ /etc/init.d/S50sshd start
Starting sshd: OK
~ $ /etc/init.d/S50sshd stop
Stopping sshd: OK
~ $
```

You can start the service by adding the first argument start, and stop the service by adding the first argument stop

3-3 Setting System Time

The JetBox3300 has two time settings. One is the system time, and the other is the RTC (Real Time Clock) time kept by the JetBox3300's hardware.

Use the **#date** command to query the current system time or set a new system time.

```
#date MMDDhhmmYYYY
MM = Month
DD = Date
hhmm = hour and minute
YYYY = Year
```

Use **#hwclock** to query the current RTC time

Use the following command to set system time from hardware clock:

```
#hwclock -s
```

The following figure illustrates how to update the system time and set the RTC time.

```
~ $ date
Tue Nov 30 00:00:01 UTC 1999
~ $ date 080800002012
Wed Aug  8 00:00:00 UTC 2012
~ $ hwclock -w
~ $ date
Wed Aug  8 00:00:17 UTC 2012
~ $
```

Setting the Time Manually

3-4 Adjust System Time

If you only wish to synchronize your clock when the device boots up, you can use **ntpdate**. This may be appropriate for some devices which are frequently rebooted and only require infrequent synchronization.

Using ntpdate at boot time is also a good idea for devices that run ntpd. The ntpd program changes the clock gradually, whereas ntpdate sets the clock, no matter how great the difference between a device's current clock setting and the correct time.

3-4-1 NTP Client

The JetBox has a built-in NTP (Network Time Protocol) client that is used to initialize a time request to a remote NTP server.

Use **#ntpdate** to update the system time.

```
#ntpdate time.stdtime.gov.tw
```

```
#hwclock -w
```

```
~ $ ntpdate time.stdtime.gov.tw
Looking for host time.stdtime.gov.tw and service ntp
host found : 59-124-196-84.HINET-IP.hinet.net
10 Jul 06:29:48 ntpdate[404]: adjust time server 59.124.196.84 offset -0.021585 sec
~ $
~ $ hwclock -w
~ $ date
Tue Jul 10 06:29:59 UTC 2012
~ $
```

NTP client request

Visit http://www.ntp.org for more information about NTP and NTP server addresses.

NOTE

Before using the NTP client utility, check your IP and DNS settings to make sure that an Internet connection is available.

3-4-2 NTP Server

NTP is configured by the /etc/ntp.conf file. Here is a simple example:

```
server time.stdtime.gov.tw
driftfile /var/db/ntp.drift
```

The **server** option specifies which servers are to be used, with one server listed on each line. The **driftfile** option specifies which file is used to store the system clock's frequency offset. The ntpd program uses this to automatically compensate for the clock's natural drift, allowing it to maintain a reasonably correct setting even if it is cut off from all external time sources for a period of time.

To start the server, execute the command:

```
# ntpd
```

To check the server status, execute the command:

```
# ntpq -p 127.0.0.1
```

For more information, read the following links about setting up a NTP server:

http://www.freebsd.org/doc/handbook/network-ntp.html

3-5 Connect Peripherals

While plug-in a USB mass storage or a SD card, use **#dmesg** command can help showing USB-storage device status.

```
usb-storage: device found at 2
usb-storage: waiting for device to settle before scanning
scsi 0:0:0:0: Direct-Access     CBM      USB 2.0          8.07 PQ: 0 ANSI: 2
SCSI device sda: 3893248 512-byte hdwr sectors (1993 MB)
sda: Write Protect is off
sda: Mode Sense: 03 00 00 00
sda: assuming drive cache: write through
SCSI device sda: 3893248 512-byte hdwr sectors (1993 MB)
sda: Write Protect is off
sda: Mode Sense: 03 00 00 00
sda: assuming drive cache: write through
 sda: sda1
sd 0:0:0:0: Attached scsi removable disk sda
sd 0:0:0:0: Attached scsi generic sg0 type 0
usb-storage: device scan complete
~ $
```

usb-storage device scan status

To mount the external storage, just use ***mount*** command as following:

```
# mount -t vfat /dev/sda1 /mnt/card
```

```
sda: assuming drive cache: write through
 sda: sda1
sd 0:0:0:0: Attached scsi removable disk sda
sd 0:0:0:0: Attached scsi generic sg0 type 0
usb-storage: device scan complete
~ $ mount -t vfat /dev/sda1 /mnt/card/
```

USB:

```
rootfs on / type rootfs (rw)
/dev/root on / type cramfs (ro)
proc on /proc type proc (rw)
devpts on /dev/pts type devpts (rw)
tmpfs on /tmp type tmpfs (rw)
tmpfs on /var type tmpfs (rw)
/dev/mtdblock3 on /etc type jffs2 (rw)
sysfs on /sys type sysfs (rw)
mdev on /dev type tmpfs (rw)
devpts on /dev/pts type devpts (rw)
/dev/sda1 on /mnt/card type vfat (rw,fmask=0022,dmask=0022,codepage=cp437,iocharset=iso8
859-1)
~ $
```

As the picture shows, the usb-storage has been mounted on /mnt/card. You can access your data in the /mnt/card folder.

SD card:

```
~ $ mount
rootfs on / type rootfs (rw)
/dev/root on / type cramfs (ro)
proc on /proc type proc (rw)
devpts on /dev/pts type devpts (rw)
tmpfs on /tmp type tmpfs (rw)
tmpfs on /home type tmpfs (rw)
tmpfs on /var type tmpfs (rw)
/dev/mtdblock3 on /etc type jffs2 (rw)
sysfs on /sys type sysfs (rw)
mdev on /dev type tmpfs (rw)
devpts on /dev/pts type devpts (rw)
/dev/mmcblk0p1 on /mnt/card type vfat (rw,fmask=0022,dmask=0022,codepage=cp437,iocharset=iso8859-1)
~ $
```

To un-mount the usb-storage, execute #umount <mount path>. F

NOTE

To be able to unmount a device, you have to close all the open files in it. Type **sync** can help commits all pending writes, which can then be removed in a safe way.

Chapter 4 Network Feature

In this chapter, we explain how to configure JetBox various communication functions.

4-1 Telnet

Service name	telnetd
Description	A Telnet server
Config files	/etc/inetd.conf
Start file	/etc/init.d/rcS
Start command	--
Stop command	--
Support command	--
Default	up

Enabling the Telnet server

The following example shows the default content of the file /etc/inetd.conf. The default is to enable the Telnet server:

```
telnet stream tcp nowait root /usr/sbin/telnetd telnetd
```

Disabling the Telnet server

Disable the daemon by typing '#' in front of the first character of the row to comment out the line.

```
#telnet stream tcp nowait root /usr/sbin/telnetd telnetd
```

4-2 sshd

Service name	sshd
Description	A ssh server
Config files	/etc/sshd_config /etc/ssh_config /etc/ssh_host_dsa_key /etc/ssh_host_dsa_key.pub /etc/ssh_host_key /etc/ssh_host_key.pub /etc/ssh_host_rsa_key /etc/ssh_host_rsa_key.pub
Start file	/etc/init.d/S50sshd

Start command	/etc/init.d/S50sshd start
Stop command	/etc/init.d/S50sshd stop
Support command	
Default	up

Re-generate sshd host keys

The JetBox3300 comes with a set of default sshd host keys. To re-generate it, remove them and restart the ssh daemon.

```
# rm -f /etc/ssh_host_dsa_key /etc/ssh_host_dsa_key.pub /etc/ssh_host_key
/etc/ssh_host_key.pub /etc/ssh_host_rsa_key /etc/ssh_host_rsa_key.pub
# /etc/init.d/S50sshd restart
```

4-3 FTP

The JetBox3300 uses inetutils's FTP daemon by **default**.

Service name	ftpd
Description	A ftp server
Config file	/etc/inetd.conf
Default	up
Username	ftp
Password	ftp

The ftpd is listening on port 21.

```
~ $ netstat -an
Active Internet connections (servers and established)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
tcp        0      0 0.0.0.0:199             0.0.0.0:*               LISTEN
tcp        0      0 0.0.0.0:62001           0.0.0.0:*               LISTEN
tcp        0      0 0.0.0.0:62002           0.0.0.0:*               LISTEN
tcp        0      0 0.0.0.0:21              0.0.0.0:*               LISTEN
tcp        0      0 0.0.0.0:23              0.0.0.0:*               LISTEN
tcp        0      0 0.0.0.0:62011           0.0.0.0:*               LISTEN
tcp        0      0 0.0.0.0:62012           0.0.0.0:*               LISTEN
tcp        0      2 192.168.10.1:23         192.168.10.3:15864      ESTABLISHED
udp        0      0 0.0.0.0:5010            0.0.0.0:*
udp        0      0 0.0.0.0:161             0.0.0.0:*
udp        0      0 0.0.0.0:69              0.0.0.0:*
Active UNIX domain sockets (servers and established)
Proto RefCnt Flags       Type       State         I-Node Path
unix  2      [ ACC ]     STREAM     LISTENING     1326   /var/run/agentx
~ $
```

4-4 ProFTP

The JetBox3300 uses inetutils's FTP daemon by default. However, you can manually disable by editing the /etc/inetd.conf and use the Proftpd instead.

Service name	proftpd
Description	A Highly configurable FTP server
Config files	/etc/proftpd.conf
Start file	/etc/init.d/S50proftpd
Start command	/etc/init.d/S50proftpd start
Stop command	/etc/init.d/S50proftpd stop
Support command	
Default	Down
Username	Root
Password	ftp

Enabling root login

Edit the /etc/proftpd.conf and add the following line, then restart the FTP server.

```
RootLogin on
```

4-5 DNS

To set up DNS client, you need to edit two configuration files:
/etc/resolv.conf,
/etc/hosts (optional)

/etc/hosts - The static table lookup for host names

This is the first file that the Linux system reads to resolve the host name and IP address.

/etc/resolv.conf – DNS resolver configuration file

This is the most important file that you need to edit when using DNS for the other programs. For example, before you use #ntpdate time.nist.goc to update the system time, you will need to add the DNS server address to the file. Ask your network administrator which DNS server address you should use.

The DNS server's IP address is specified with the "nameserver" command. For example, add the following line to /etc/resolv.conf if the DNS server's IP address is 168.95.1.1:

```
nameserver 168.95.1.1
```

Figure 4-5 nameserver

4-6 Web Server

Service name	webs
Description	web server for embedded system
Config files	--
Start file	--
Start command	--
Stop command	--
Support command	webs
Default	down

The GoAhead WebServer is an open standard web server that is compliant with all necessary standards to be an effective embedded web server.

The GoAhead web server's command is webs, with the default root located at /web/. The web server default listening port is 80.

Because the /web directory is not writable, you can either mount a memory to it:

```
mount -t tmpfs tmpfs /web
```

Or just mount a CF or SD card directory to the /web directory. For example:

```
mount /mnt/card /web
```

Start WEB server:

```
webs &
```

For more information, read the following links about GoAhead web server:
http://www.goahead.com/products/webserver/specifications.aspx

4-7 IPTABLES

program name	iptables
Description	nating
Usage:	
iptables -[AD] chain rule-specification [options] iptables -[RI] chain rulenum rule-specification [options] iptables -D chain rulenum [options] iptables -[LFZ] [chain] [options] iptables -[NX] chain iptables -E old-chain-name new-chain-name iptables -P chain target [options] iptables -h (print this help information)	

iptables is a user space application program on JetBox3300 that allows to configure the tables provided by the Linux kernel firewall (implemented as different Netfilter modules) and the chains and rules it stores. Different kernel modules and programs are currently used for different protocols; iptables applies to IPv4, ip6tables to IPv6, arptables to ARP, and ebtables as a special for Ethernet frames. A firewall using iptables is said to be a stateful firewall.

iptables splits the packet handling into three different tables, each of which contain a number of chains. The firewalling rules, which we create, are included within a particular chain. The three tables are:

1. **filter**: used for packet filtering
2. **nat**: used to provide packet modification capabilities; NAT/PAT and IP masquerading
3. **mangle**: used for setting packet options and marking packets for further filtering or routing

The **filter** table is the default table for any rule. It is where the bulk of the work in an iptables firewall occurs. This table contains three chains:

1. INPUT: used for traffic which is entering our system and belongs to an IP address which is on our local machine
2. OUTPUT: used for traffic which originated on the local system, otherwise known as the firewall
3. FORWARD: used for traffic which is being routed between two network interfaces on our firewall

There are three main targets for a rule within the filter table.

1. ACCEPT: allows the packet to be passed through the firewall without any noticeable interaction

2. DROP: simply drops the packet as if it has never been in the system
3. REJECT: drops the packet then sends a ICMP reply back to the client telling it why the connection failed

Example:

Add rules

The basic syntax of an iptables command is:

```
iptables -A INPUT -s 192.168.20.0/24 -j ACCEPT
```

This would add a rule into the INPUT chain, which matches any packet with a source address in the 192.168.20.0 subnet. If a packet matches this criteria, then it would use the ACCEPT target, which simply allows the packet on through.

Remove rules

To delete the first rule in the chain, we would do:

```
iptables -D INPUT 1
```

List rules

To list the rules we have on our system use:

```
iptables -L
```

Flush rules

To flush (drop) all the rules we can use:

```
iptables -F
```

A more complete tutorial can be found at: 32]

4-8 PPPd

PPP (Point to Point Protocol) is used to run IP (Internet Protocol) and other network protocols over a serial link. PPP can be used for direct serial connections (using a null-modem cable) over a Telnet link, and links established using a modem over a telephone line. *Usually pppd is called by other daemon, like PPPoE, PPTP, and Wvdial.*

4-9 PPPoE

Service name	pppoe
Description	Point-to-Point Protocol over ethernet

Config files	/etc/ppp/pppoe.conf
Start file	
Start command	
Stop command	
Support command	**pppoe-connect** **pppoe-setup** **pppoe-start** **pppoe-stop** **pppoe-status**
Default	down

Point-to-Point Protocol over Ethernet is a network protocol for encapsulating Poing-to-Point Protocol (PPP) frames inside Ethernet frames. It is used mainly with ADSL services where individual users connect to the ADSL transceiver over Ethernet.

You can just inpput pppoe-setup to configure the PPPoE. First you should obtain PPPOE username and password from your Internet provider. Second, filled in these parameters to pppoe-setup dialog:

- **Ethernet Interface: wan**
- **User name: <from your ISP>**
- **Activate-on-demand: No**
- **Primary DNS: 168.95.1.1**
- **Firewalling: NONE**

```
# pppoe-setup
Welcome to the Roaring Penguin PPPoE client setup.  First, I will run
some checks on your system to make sure the PPPoE client is installed
properly...

Looks good!  Now, please enter some information:

USER NAME
>>> Enter your PPPoE user name (default bxxxnxnx@sympatico.ca): 7360011@hinet.net

INTERFACE
>>> Enter the Ethernet interface connected to the DSL modem
(default eth0): eth0
```

```
Do you want the link to come up on demand, or stay up continuously?
>>> Enter the demand value (default no): no

DNS

Please enter the IP address of your ISP's primary DNS server.
>>> Enter the secondary DNS server address here:

PASSWORD

>>> Please enter your PPPoE password:
```

Then use the pppoe-start command to start dial to connect network.

4-10 SNMP

Service name	snmpd
Description	SNMP Daemon
Config files	/etc/snmp/snmpd.conf
Start file	
Start command	
Stop command	
Support command	snmpget snmpset
Default	down

Net-SNMP is a suite of applications used to implement SNMP v1, SNMP v2c and SNMP v3 using both IPv4 and IPv6. It supports RFC 1213 MIB-II.

For more information, read the following links about NET-SNMP:
http://www.net-snmp.org/wiki/index.php/Tutorials

4-11 OpenVPN

Service name	openvpn

Description	A full-featured SSL VPN
Config files	/etc/openvpn/ /etc/openvpn/easy-rsa/
Start file	/etc/init.d/openvpn
Start command	/etc/init.d/openvpn start
Stop command	/etc/init.d/openvpn stop
Default	down

OpenVPN is a full-featured SSL VPN which implements OSI layer 2 or 3 secure network extension using the industry standard SSL/TLS protocol, supports flexible client authentication methods based on certificates, smart cards, and/or username/password credentials, and allows user or group-specific access control policies using firewall rules applied to the VPN virtual interface.

For more information, download the step-by-step how to from Korenix website:
http://www.korenixembedded.com/support/faqs/vpn

4-12 Ser2net

program name	ser2net
Description	ser2net is a Linux program which will connect a network to the serial port. It could be like a bridge between the ethernet cable and the serial cable.
config file	/etc/ser2net.conf

Usage:

-c <config file> - use a config file besides /etc/ser2net.conf

-C <config line> - Handle a single configuration line. This may be specified multiple times for multiple lines. This is just like a line in the config file. This disables the default config file, you must specify a -c after the last -C to have it read a config file, too.

-p <controller port> - Start a controller session on the given TCP port

-P <file> - set location of pid file

-n - Don't detach from the controlling terminal

-d - Don't detach and send debug I/O to standard output

-u - Disable UUCP locking

-b - Do CISCO IOS baud-rate negotiation, instead of RFC2217

-v - print the program's version and exit

Example:

- **Setup a TCP server with following operation parameter:**

  Serial port : 1
  TCP port : 62001
  Baud rate : 9600
  Data bits : 8
  Parity : none
  Stop bit : 1
  Hardware flow control : none
  State : raw state
  timeout : never timeout
  modem mode : none

  Edit /etc/ser2net.conf add the following line:

```
62001:raw:0:/dev/ttyS1:9600 NONE 1STOPBIT 8DATABITS LOCAL -RTSCTS
```

  Then run the ser2net program:

```
ser2net &
```

For more information, please see reference [1].

Chapter 5 Korenix Feature

5-1 Ethertool

program name	ethtool
Description	LAN port configuration tool

$ ethtool

ethtool version 3

Usage:

ethtool DEVNAME

ethtool -s DEVNAME

[speed 10|100|1000]

[duplex half|full]

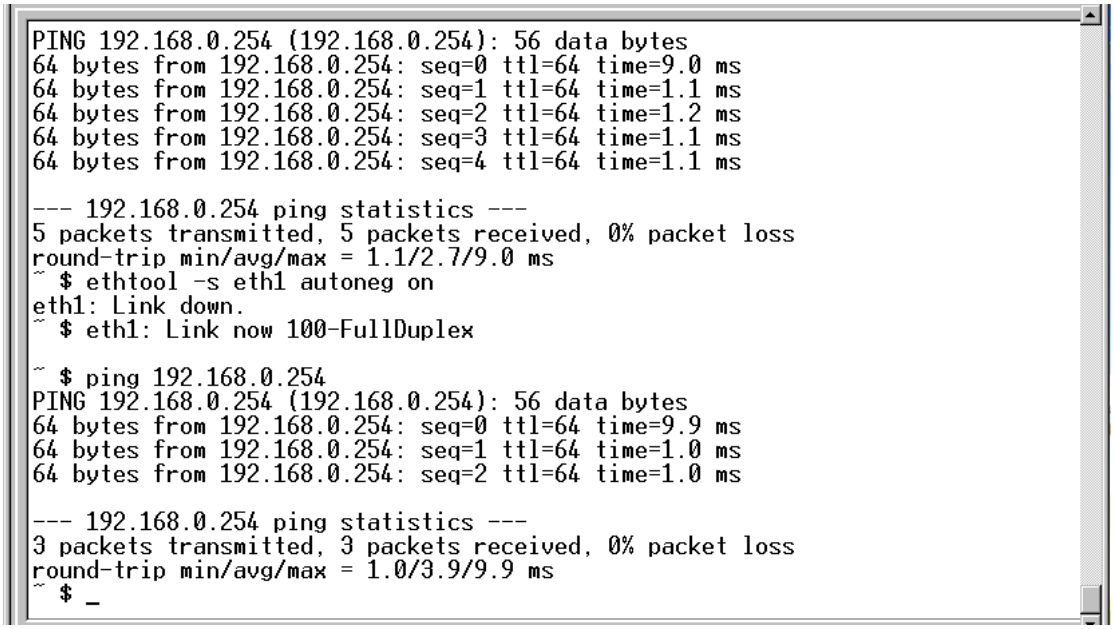
[autoneg on|off]

Example:

Auto Negotiation:

When Ethernet device works on FORCE mode, user can use below command to setup device mode again.

1. AUTO mode: ethtool –s eth1 autoneg on



2 Force Speed and Duplex Mode:

When Ethernet device works on AUTO NEGOTIATION mode, user can use below commands to setup device mode again.

1. FORCE mode: ethtool –s eth1 autoneg off
2. SPEED: ethtool –s eth1 speed [100/10]

3. DUPLEX: ethtool –s eth1 duplex [full/half]

```
~ $ ethtool -s eth1 autoneg off
~ $ ethtool -s eth1 speed 10
eth1: Link now 10-FullDuplex
~ $ eth1: Link down.
~ $ ethtool -s eth1 speed 1eth1: Link now 10-FullDuplex

~ $ ethtool -s eth1 duplex half
eth1: Link now 10-HalfDuplex
~ $ ping 192.168.0.254
PING 192.168.0.254 (192.168.0.254): 56 data bytes
64 bytes from 192.168.0.254: seq=0 ttl=64 time=9.0 ms
64 bytes from 192.168.0.254: seq=1 ttl=64 time=1.1 ms
64 bytes from 192.168.0.254: seq=2 ttl=64 time=1.2 ms
64 bytes from 192.168.0.254: seq=3 ttl=64 time=1.1 ms
64 bytes from 192.168.0.254: seq=4 ttl=64 time=1.1 ms

--- 192.168.0.254 ping statistics ---
5 packets transmitted, 5 packets received, 0% packet loss
round-trip min/avg/max = 1.1/2.7/9.0 ms
~ $ _
```

5-2 Diocfg

program name	diocfg
Description	Get/Set DIO Configuration

Usage:

diocfg -g [I|O] [PORT_NUM: 0-7] - get DIO status.

diocfg -s [PORT_NUM: 0-7] [PORT_MODE: 0|1] - set DO mode.

- PORT_MODE: {0:OFF, 1:ON}.

diocfg -M [PORT_NUM: 0-1] - get serial port mode.

diocfg -m [PORT_NUM: 0-1] [PORT_MODE: 0-3] - set serial port mode.

- PORT_MODE: {0:RS232, 1:RS422, 2:RS485-2w, 3:RS485-4w}.

diocfg -f fw_ver - show firmware version.

Example:

1 Get DIO status:

JetBox 3300 offers 8 DI and 8 DO pin. User can use below commands to process DI or DO operation.

1. DI: diocfg –g I [PORT]

   - PORT is from 0 to 7 for pins.

2. DO: diocfg –g O [PORT]

   - PORT is from 0 to 7.

2 Set DO mode:

User can use below command to process DO operation.

1. DO: diocfg –s [PORT] [MODE]
   - PORT is from 0 to 7.
   - MODE is from 0 to 1 for pin status.

3 Set serial port mode:

User can use below command to process serial mode operation.

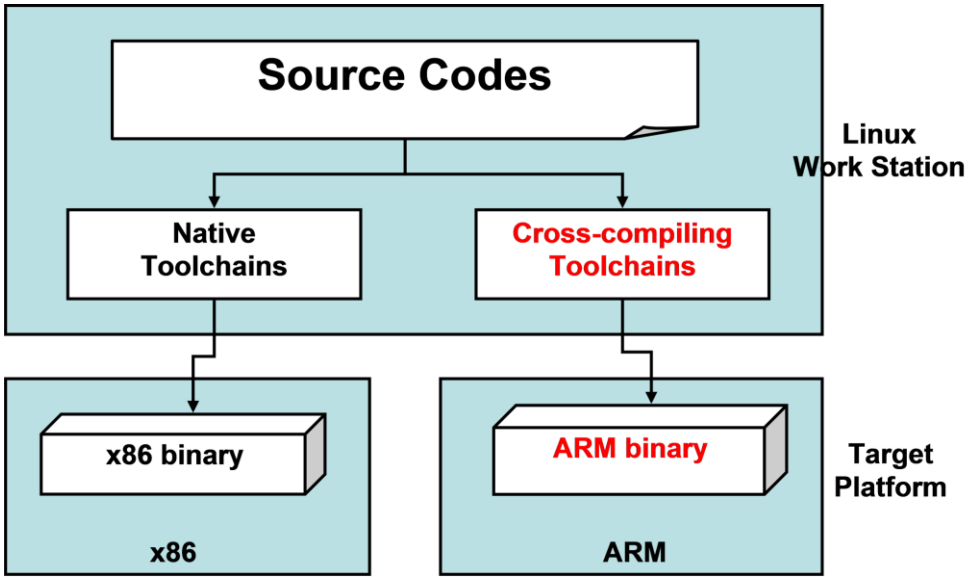
1. SERIAL: diocfg –m [PORT] [MODE]
   - PORT is from 0 to 1 for serial port.
   - MODE is from 0 to 3.
     - MODE 0: RS-232 mode.
     - MODE 1: RS-422 mode.
     - MODE 2: RS-485 2-line mode.
     - MODE 3: RS-485 4-line mode.

Chapter 6 Programmer's Guide

6-1 Toolchain Introduction

To ensure that an application will be able to run correctly when installed on Jetbox, you must ensure that it is compiled and linked to the same libraries that will be present on the Jetbox3300.

The cross-compiling toolchain that comes with JetOS93 Lite SDK contains a suite of Korenix compilers and other tools, as well as the libraries and headers that are necessary to compile applications for Jetbox3300. The build environment must be running Linux and install with the JetOS93 Lite Toolchain. We have confirmed that the following Linux distributions can be used to install the tool chain: Fedora Core 9, Centos 5.



The Toolchain will need about 208 MB of hard disk space on your Linux PC. The JetOS 9300 toolchain is included in the JetOS93 Lite SDK, which can download from http://www.korenixembedded.com.

The SDK can be extract at any directory, for example, your HOME directory.
You can extract the SDK with following command:

```
tar zxvf jetbox9300_sdk-<version>.tgz
```

The README file will teach you how to install the Toolchain, and application examples are in the **ap_src** directory.

6-1-1 Compiling Applications and Libraries

To compile a simple C application, just use the aremb-linux-gcc compiler instead of the regular one:

```
arm-linux-gcc -g -02 source-code.c -o output
```

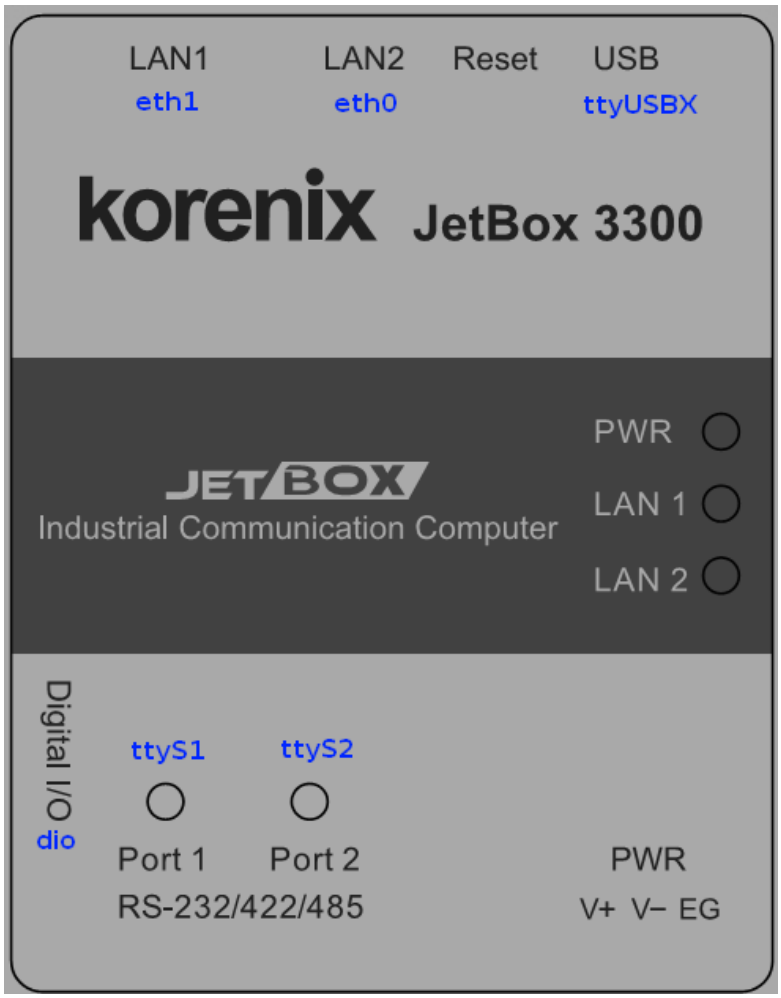
6-1-2 Tools Available in the Host Environment

The following cross compiler tools are provided:

arm-linux-ar	Manage archives (static libraries)
arm-linux-as	Assembler
arm-linux-c++	C++ compiler
arm-linux-cpp	C preprocessor
arm-linux-g++	C++ compiler
arm-linux-gcc	C compiler
arm-linux-gprof	Display call graph profile data
arm-linux-ld	Linker
arm-linux-nm	Lists symbols from object files
arm-linux-objcopy	Copies and translates object files
arm-linux-objdump	Displays information about object files
arm-linux-ranlib	Generates indexes to archives (static libraries)
arm-linux-readelf	Displays information about ELF files
arm-linux-size	Lists object file section sizes
arm-linux-strings	Prints strings of printable characters from files (usually object files)
arm-linux-strip	Removes symbols and sections from object files (usually debugging information)

6-2 External vs. internal naming

In Linux systems, a device file or special file is an interface for a device driver that appears in a file system as if it were an ordinary file. The JetOS93 use the following naming for hardware devices, the device names are colored with blue on the picture below.


LAN1
eth1
LAN2
eth0
Reset
USB
ttyUSBX
korenix JetBox 3300
JETBOX
Industrial Communication Computer
PWR
LAN 1
LAN 2
Digital I/O
dio
ttyS1
ttyS2
Port 1
Port 2
RS-232/422/485
PWR
V+ V− EG

6-3 Device API

ioctl

Name

ioctl - control device

Library

Standard C Library (libc, -lc)

Synopsis

#include <sys/ioctl.h>

int **ioctl**(*int d*, *unsigned long request*, ...);

Description

The **ioctl**() system call manipulates the underlying device parameters of special files. In particular, many operating characteristics of character special files (e.g. terminals) may be controlled with **ioctl**() requests. The argument *d* must be an open file descriptor.

The third argument to **ioctl**() is traditionally named *char *argp*. Most uses of **ioctl**(), however, require the third argument to be a *caddr_t* or an *int*.

An **ioctl**() *request* has encoded in it whether the argument is an ''in'' argument or ''out'' argument, and the size of the argument *argp* in bytes. Macros and defines used in specifying an ioctl *request* are located in the file <*sys/ioctl.h*>.

Return Values

If an error has occurred, a value of -1 is returned and *errno* is set to indicate the error.

Please use the desktop Linux's man page for detailed documentation:
#man ioctl

6-4 RTC

The device node is located at /dev/rtc0. Jetbox supports Linux standard simple RTC control.
You must include <linux/rtc.h>

.

1. Function: RTC_RD_TIME
   int ioctl(fd, RTC_RD_TIME, struct rtc_time *time);
   Description: read time information from RTC. It will return the value on argument 3.

2. Function: RTC_SET_TIME
   int ioctl(fd, RTC_SET_TIME, struct rtc_time *time);
   Description: set RTC time. Argument 3 will be passed to RTC.

6-5 Watch Dog Timer

A Watchdog Timer (WDT) is a hardware circuit that can reset the computer system in case of a software fault. You probably knew that already.

The Watchdog Driver has one basic role: to talk to the card and send signals to it so it doesn't reset your computer ... at least during normal operation.

The ioctl API:

- Pinging the watchdog using an ioctl:
  WDIOC_KEEPALIVE:,
  This ioctl does exactly the same thing as a write to the watchdog device, so the main loop in the program could be:

```
while (1) {
        ioctl(fd, WDIOC_KEEPALIVE, 0);
        sleep(10);
}
```

  The argument to the ioctl is ignored.

- Setting and getting the timeout:

  To modify the watchdog timeout on the fly with the SETTIMEOUT ioctl, driver has the WDIOF_SETTIMEOUT flag set in their option field. The argument is an integer representing the timeout in seconds. The driver returns the real timeout used in the same variable, and this timeout might differ from the requested one due to limitation of the hardware.

```
int timeout = 45;
ioctl(fd, WDIOC_SETTIMEOUT, &timeout);
printf("The timeout was set to %d seconds\n", timeout);
```

Starting with the Linux 2.4.18 kernel, it is possible to query the current timeout using the GETTIMEOUT ioctl.

```
ioctl(fd, WDIOC_GETTIMEOUT, &timeout);
printf("The timeout was is %d seconds\n", timeout);
```

Chapter 7 Appendix

7-1 Firmware Upgrade

Firmware upgrade can be done by the “firmware_up” command.

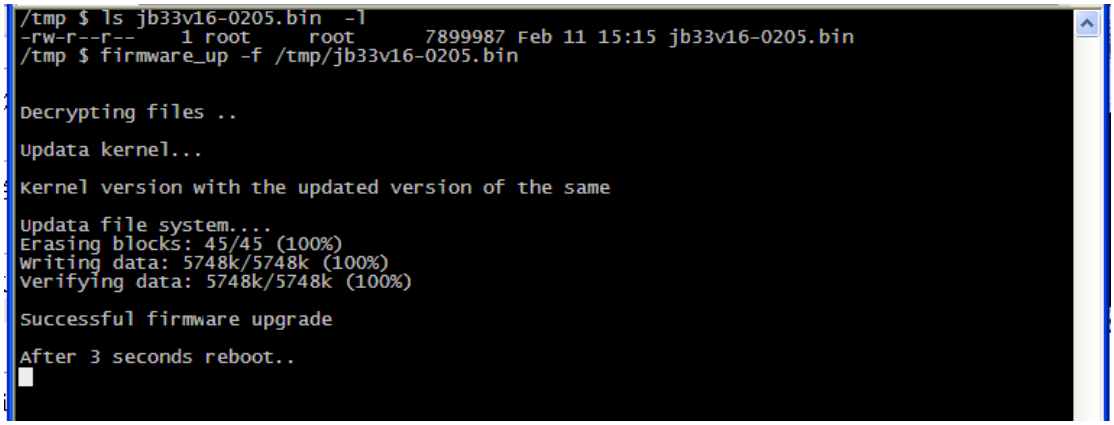
```
# firmware_up


Usage: -f [firmware file]
       -t [firmware file] [tftp server]
       -w [http or ftp url]
```

Upgrade system by local file:

1. LOCAL UPGRADE: Firmware_up –f [IMAGE]

   - IMAGE is the kernel and system combining file.



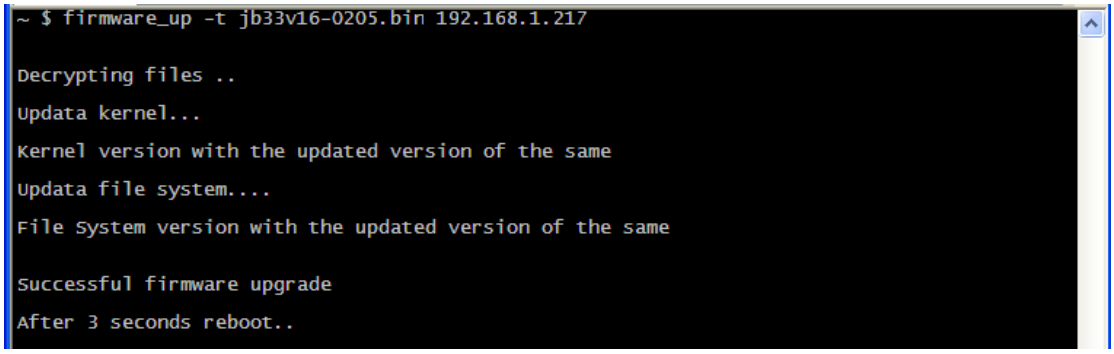
Upgrade system by TFTP download:

User can upgrade system via TFTP server also.

1. TFTP UPGRADE: Firmware_up –t [IMAGE] [TFTP_SERVER]

   - IMAGE is the kernel and system combining file.

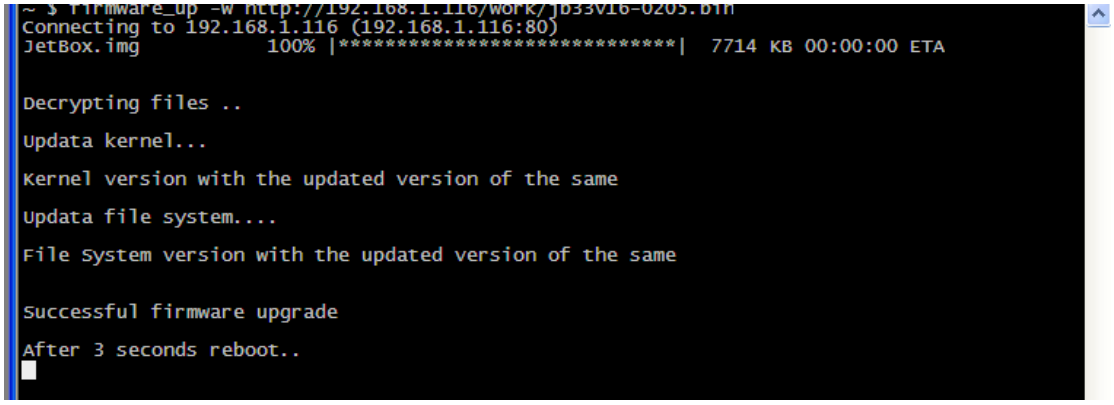
   - TFTP_SERVER is TFTP server IP address.



Upgrade system by FTP or HTTP download:

User can upgrade system via FTP or HTTP server also.

1. HTTP UPGRADE: Firmware_up -w [IMAGE_URL]
   - IMAGE_URL is image URL path.
2. FTP UPGRADE: Firmware_up -w [USER_P] @[IMAGE_FTP]
   - USER_P is user name and password, ex: “name:password”.
   - IMAGE_FTP is image path.



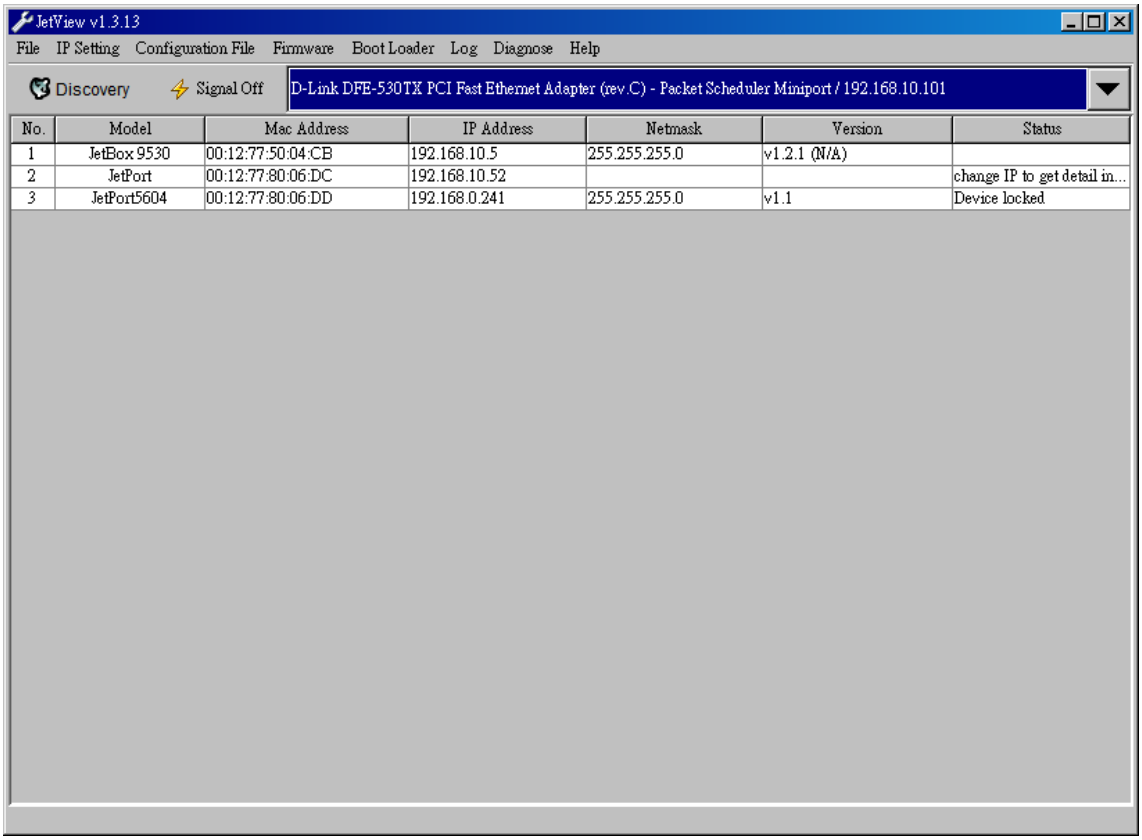
7-2 JetView

7-2-1 Overview

The JetView is a device management utility which support various device management features- such as device recovery, firmware and boot loader upgrade, configuration backup and restore, system event log listing, basic system IP address modify.

7-2-2 JetView for JetBox 3300

Start from firmware v2.2, JetBox3300 can be discovered on LAN1, change IP address, firmware upgrade, and reboot through JetView.


JetView v1.3.13
File IP Setting Configuration File Firmware Boot Loader Log Diagnose Help
Discovery
Signal Off
D-Link DFE-530TX PCI Fast Ethernet Adapter (rev.C) - Packet Scheduler Miniport / 192.168.10.101
No. Model Mac Address IP Address Netmask Version Status
1 JetBox 9530 00:12:77:50:04:CB 192.168.10.5 255.255.255.0 v1.2.1 (N/A)
2 JetPort 00:12:77:80:06:DC 192.168.10.52 change IP to get detail in...
3 JetPort5604 00:12:77:80:06:DD 192.168.0.241 255.255.255.0 v1.1 Device locked

7-3 Software Specification

Item	Protocol	Notes	JetBox 93 lite
Boot Loader			uboot
Kernel			2.6.21
	ARP		x
	PPP		x
	CHAP		x
	IPv4		x
	PAP		x
	ICMP		x
	TCP		x
	UDP		x
File System			
JFFS2			x
Ext2			x
Ext3			x
VFAT			x
FAT			x
Device Driver			
DIO			x
Ethernet			x
SD / Micro-SD card			x
UART			x
USB			x
Watchdog timer			x
Programming API			
GPIO access			diocfg
RS-232/422/485 configuration			diocfg
Watchdog API*			driver auto control only
Board ID control*			diocfg
Kernel LED control*			diocfg

Item	Protocol	Notes	JetBox 93 lite
Base SW package			
Shell		OS shell command	GNU ash
Busybox		Linux normal command utility	1.6.0
telnetd	Telnet	telnet server daemon	x
inetd		TCP server manager program	x
udhcp	DHCP	DHCP client/server	x
syslogd			x
diocfg	DIO	DIO configure tool	x
lrzsz		Tools for zmodem/xmodem/ymodem file transfer	0.12.20
minicom		Serial port terminal	2.3
microcom		Serial port terminal	1.02
ncurses		terminal-independent method of updating character screens	5.7
ser2net		telnet and tcp sessions to be established with serial port	2.7
setserial		RS-232 serial port setting tool	2.17
Network related SW package			
bridge-utils		Ethernet bridge utility	1.0.6
ethtool		Ethernet configure tool	3.1
goahead	HTTP	Web server	2.1.8
iptables		NAT and access control setting tool	1.3.7
net-snmp	SNMP v1/v2c/v3	SNMP support package	5.1.2
ntp	NTP	NTP utility	4.2.0
modbusgw	Modbus	Modbus TCPto RTU/ASCII gateway	(optional)
openssh	SSH1.0/2.0	SSH support package	3.9
openssl	SSL	SSL support package	0.9.7
pppd	PPP	PPP protocol for Linux	2.4.4
ftpd	FTP	ftp server daemon	0.9.8
rp-pppoe	PPPoE	PPPOE support package	3.8

Item	Protocol	Notes	JetBox 93 lite
smtpclient		email client	1.0
wireless-tools	802.11	Tools of WLAN card	29
***Supported by JB3300 series only**			

7-4 Busybox command

busybox(V1.8.2): Linux command collection

File Manager	
cp	copy file
ls	list file
ln	make symbolic link file
mount	mount and check file system
rm	delete file
chmod	change file owner & group & user
chown	change file owner
chgrp	change file group
sync	Sync file system, let system file buffer be saved to hardware
mv	move file
pwd	display now file directly
df	list now file system space
mkdir	make new directory
rmdir	delete directory

Editor	
vi	text editor
cat	dump file context
zcat	compress or expand files
grep	search string on file
cut	get string on file
find	find file where are there
more	dump file by one page
test	test file exist or not
sleep	sleep(seconds)
echo	Echo string
awk	Pattern scanning and processing language.
diff	compare two files or directories
sed	perform text transformations on a file or input from a pipeline.
xargs	execute a specified command on every item from standard input.

Archival Utilities	
bzip2/bunzip2	Compress/Uncompress bzip FILE
cpio	Extract or list files from a cpio archive
gzip/gunzip	Compress/Uncompress FILE with maximum compression.
tar	Create, extract, or list files from a tar file
unzip	Extract files from ZIP archives

System logging	
syslogd	Utility used to record logs of all the significant events
klogd	Utility which intercepts and logs all messages from the Linux kernel and sends to the 'syslogd'
logger	Utility to send arbitrary text messages to the system log

Network	
ping	ping to test network
arp	Manipulate the system ARP cache
arping	Ping host by ARP packets
ftpget	Retrieve a remote file via FTP
ftpput	Store a remote file via FTP
nslookup	Tool to query Internet name servers
pscan	Simple network port scanner
traceroute	Utility to trace the route of IP packets
wget	Utility for non-interactive download of files from HTTP, HTTPS, and FTP servers.
udhcpc	DHCP client
route	routing table manager
netstat	display network status
Ifconfig	set ip address and configure network interfaces
traceroute	trace route
tftp	Trivial File Transfer Protocol client
telnet	Telnet client
ftp	FTP client

Others	
dmesg	dump kernel log message
stty	stty is used to change and print terminal line settings
zcat	dump .gz file context
mknod	make device node
free	display system memory usage
date	print or set the system date and time
env	run a program in a modified environment
clear	clear the terminal screen
reboot	reboot / power off/on the server
halt	halt the server
du	estimate file space usage
hostname	show system's host name
kill/killall	Send specified signal to the specified process or process group

For complete command usage and explanation, please refer to following website:

http://www.busybox.net/downloads/BusyBox.html

Chapter 8 Reference:

1. ser2net(8) – Linux man page
2. iptalbes(8) – Linux man Page
3. Netfilter IPTables Mini Howto

Chapter 9 Customer Service

Korenix Technology Co., Ltd.

Business service: sales@korenixembedded.com, sales@korenix.com

Customer service: koreCARE@korenix.com

Web Site: http://www.korenixembedded.com, http://www.korenix.com